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EXAMINER	
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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 20

Application Number: 09/536,932
Filing Date: March 27, 2000
Appellant(s): PETTIPIECE ET AL.

MAILED

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GROUP 2800

Kevin T. LeMond
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/9/03.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) ***Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) ***Status of Claims***

Although the statement of the status of the claims contained in the brief is correct, the contents of claim 12 is not correct.

Claim 12 as presently standing and as presently examined recites:

"*... polarizing beam splitter* ***substantially*** *reflects a first polarization and* ***substantially*** *transmits a second* ***preferred*** *polarization*"

In contrast, it appears in the Version with Markings to Show Changes Made in the Appellant's last amendment (Paper No.14 received 9/5/03) attempted to amend claim 12 to recite:

"*... polarizing beam splitter* ***substantially*** *reflects a first polarization and* ***substantially*** *transmits a second polarization*"

Contrary to the presently standing claim 12, in the Appendix of Appellants' Brief, claim 12 recites:

"*...polarizing beam splitter* ***substantially*** *reflecting a first* ***preferred*** *polarization and* ***substantially*** *transmits a second polarization*"

In the Appeal Brief, Appellants argue that none of the cited references disclose or suggest:

"a polarizing beam splitter ***preferentially*** *reflecting a first polarization and* ***preferentially*** *transmitting a second polarization."*

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 12-13 and 23-26 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

U.S. Patent 6,007,996	McNamara et al	12-1999
U.S. Patent 5,539,517	Cabib et al	7-1996
U.S. Patent 3,822,942	Hock	7-1974

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 12, 13, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNamara et al. (6,007,996) in view of Cabib et al. (5,539,517) and Hock (3,822,942).

McNamara et al. describe an in situ method of analyzing cells comprising:

a source for illuminating a sample with radiation within a first band of wavelengths, wherein said first band of wavelengths excites regions within said sample causing said regions to emit radiation within a second band of wavelengths;

an interferometer (Figure 2) for spectrally resolving said wavelengths within said second band of wavelengths, wherein said interferometer creates an interferogram of said sample that is

superimposed on an image of said sample transmitted by said interferometer, wherein said interferometer includes:

at least two mirrors; and

one beam splitter (33);

a detector array (37), wherein said sample and said interferogram of said sample are imaged on said detector array, wherein said detector array outputs a plurality of signal corresponding to an intensity at each pixel of said array; and

a processor (28) coupled to said detector array and coupled to a monitor (28), said processor displaying an image of said sample on said monitor.

McNamara et al. do not expressly show that the mirrors of the interferometer has rotating mirrors, however McNamara teaches that the interferometer is disclosed in US Patent 5,539,517 to Cabib et al and Cabib et al shows that the mirrors are rotating mirrors, thus it would have been inherent that the mirrors of McNamara are rotating.

McNamara et al do not show the use of polarized light, in particular, a polarizing beamsplitter. Hock shows a Sagnac interferometer in Figure 9 wherein the beamsplitter is a polarizing beamsplitter that substantially reflects a first polarization and substantially transmits a second preferred polarization. At the time of the invention, one of ordinary skill in the art would have modified the Sagnac interferometer of McNamara to use the polarizing beamsplitter of Hock's Sagnac interferometer since Hock teaches that the light leaves the interferometer "loss-

free," and it is within the general knowledge of one of ordinary skill in the art to use polarized light in an interferometer to minimize light lost in an interferometer due to cross-talk.

One of ordinary skill in the art would see that the light leaving the interferometer of McNamara is only a partial amount of light that enters the interferometer. In the McNamara interferometer, the light from the source is split at the beamsplitter so that 50% reflects to a first path and the other 50% transmits to a second path. The light traveling the first path is directed around back to the beamsplitter where half of the 50% of the light is transmitted to the detector resulting in a total amount of 25% of the original light at the detector and the other half of the 50% is reflected back to the light source. The similar occurs to light going in the second path so that there is a total of 50% of the original light eventually reaching the detector (25% from the first path and 25% from the second path).

Hock teaches that the polarized Sagnac interferometer is "loss-free" as explained in column 9, lines 58+ so that all the light entering the interferometer reaches the detector. Therefore, one of ordinary skill in the art would have modified the interferometer of McNamara with Hock.

As for claim 13, Figure 9 of Hock does not show the polarized beamsplitter as a cube but rather shows a schematic figure of a beamsplitter. Official Notice is taken that polarizing beamsplitter cubes as shown by Hock in Figure 1, are old and well known in the art to split a polarized light. See In Re Malcolm 1942 C.D.589: 543 O.G.440, and it would have been obvious as a matter of design choice to use a polarized beamsplitting cube since the applicant has

not disclosed that a polarized beamsplitting cube solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the polarized beamsplitting cube over a plate or disc.

As for claims 23 and 24, it would have obvious to one of ordinary skill in the art to provide the s-polarized and p-polarized beams since they are plane polarized as taught by Hock and s-polarized with the p-polarized light is a notoriously known nomenclature for plane polarized light.

As for claim 25, although McNamara expressly shows that the mirrors are configured to turn independently. It would have been obvious to one of ordinary skill in the art to configure the mirrors to turn independently so that proper alignment of each of the optical elements.

(11) Response to Argument

The Office submits that claims 12-13 and 23-26 are obvious in view of McNamara et al., Cabib et al., and Hock.

The Appellants do not argue that it is obvious to combine McNamara et al.. with Cabib et al. in order to obtain a Sagnac interferometer having the at least two turning mirrors.

The Appellants argue that none of the cited references disclose or suggest *a polarizing beam splitter preferentially reflecting a first polarization and preferentially transmitting a second polarization* and that in particular that Hock does not show a polarizing beam splitter.

In response to Appellants' argument that none of the references show *a polarizing beam splitter preferentially reflecting a first polarization and preferentially transmitting a second polarization*, Hock shows in Figure 9 and describes in columns 9-10 "a polarizing divider mirror **913**....generating two partial ray bundles vibrating perpendicular to one another...firstly transmitted....firstly reflected ray bundle.

Hock recites in the pertinent passage:

> "In an interferometer of the Sagnac type, shown in Fig. 9, a laser (not shown) at **911** illuminates a polarizing divider mirror **913** with light which is circularly polarized or linearly polarized at 45 degrees to the plane of the drawing. There are generated two partial ray bundles, vibrating perpendicularly to one another and rotating to the right or respectively left, which, after turning round via reflectors **915**, **915a** leave the interferometer again loss-free, as the ray bundle firstly transmitted is also transmitted again after turning round, while the firstly reflected ray bundle is also reflected again after turning round."

Through that passage and Figure 9, Hock shows that:

1) Circularly or linearly polarized light (depending on which polarization the skilled artisan selects) impinges a polarizing divider mirror **913**, since Hock recites "....illuminates a polarizing divider mirror **913** with light which is circularly polarized or linearly polarized at 45 degrees...."

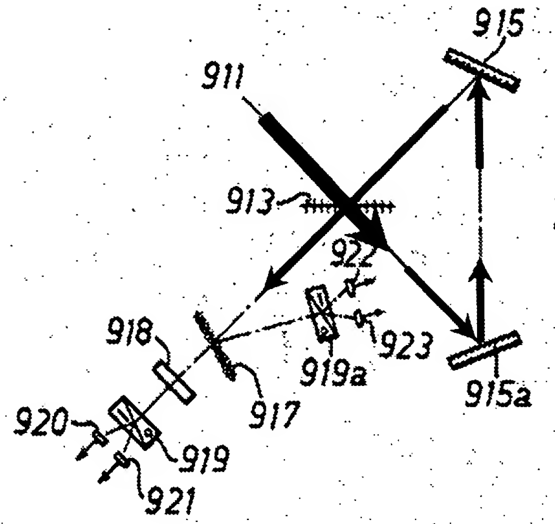
2) The polarizing divider mirror **913** divides (splits) the polarized light into two partial ray bundles. For example, the first partial ray bundle is vertically polarized and the second partial ray bundle is horizontally polarized, since Hock recites "...There are generated two partial ray bundles, vibrating perpendicularly to one another..." A linearly polarized beam at 45 degrees contain an equal intensity of vertically (90 degrees or s-polarization) polarized light and horizontally (0 degrees or p-polarization) polarized light.

3) The horizontally polarized ray bundle is transmitted through the polarizing divider mirror **913**, reflects off of mirror **915a**, and reflects off of mirror **915**. The beam proceeds to be transmitted again through mirror **913**, since Hock recites "....the ray bundle firstly transmitted is also transmitted again after turning round..."

Below are two figures describing the paths of the transmitted and reflected beams. One illustrating the path of the transmitted partial ray bundle and other, the path of the reflected partial beam.

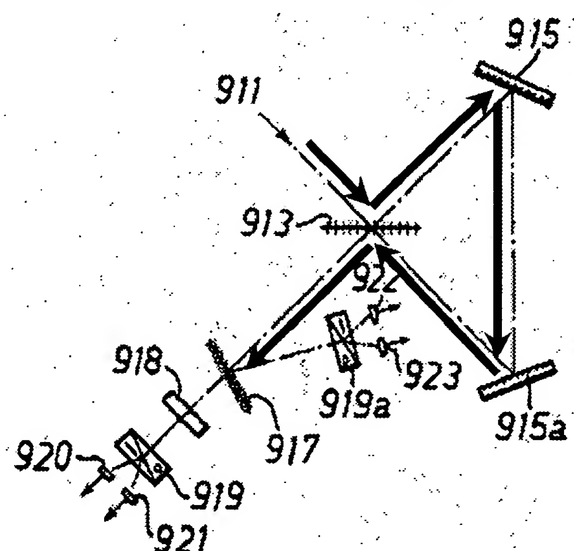
Following the path of the figure having the transmitted partial ray bundle, the input beam **911**, is split by the polarizing beam divider **913** such that the transmitted partial ray bundle is transmitted through the polarizing beam divider **913** and is incident on mirror **915a**. The transmitted beam is then reflected off of mirror **915** back to the polarizing beam divider **913**. The beam is again transmitted through polarizing beam divider **913** and projected on the detectors (**920-923**).

Transmitted Beam



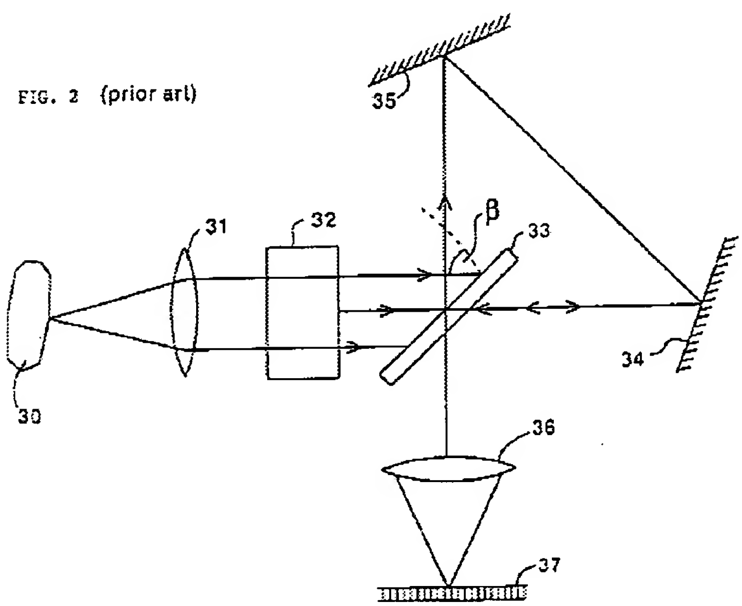
Following the path of the figure having the reflected partial ray bundle, the input beam **911**, is split by the polarizing beam divider **913** such that the reflected partial ray bundle is reflected off of the polarizing beam divider **913** and is incident on mirror **915**. The reflected beam is then reflected off of mirror **915a** back to the polarizing beam divider **913**. The beam is again reflected off of polarizing beam divider **913** and projected on the detectors **(920-923)**.

Reflected Beam



Hock alludes that by having a Sagnac interferometer that uses polarized light, that this system is "loss free". By reviewing the non-polarized Sagnac interferometer of McNamara et al and Cabib et al., one of ordinary skill in the art would see that the non-polarized Sagnac interferometer suffers from lost light as follows.

FIG. 2 (prior art)



The figure above shows a Sagnac interferometer of both McNamara et al. and Cabib et al using a beam splitter rather than a polarizing beam splitter (divider). Input beam coming through element **32** is split by beam splitter **33** such that 50% of the beam is reflected to mirror **35** and the other 50% of the beam is transmitted to mirror **34**. The reflected beam proceeds to mirror **34** and is then split by beam splitter **33** such that half of the reflected beam is lost to transmission, while the other half is reflected onto the detector **37**. This means that 25% of the original beam by means of reflection is incident on the detector **37**.

Now following the transmitted beam, the 50% of the beam that is transmitted is incident on mirror **34** then mirror **35**. Then 50% of the beam is split in half such that half is transmitted and incident on the detector **37** while other half is lost to reflection. This means that 25% of the original beam by means of transmission is incident on the detector **37**, resulting in a total of 50% is incident on the detector 37 by both transmission and reflection.

Clearly, the use of a polarizing Sagnac interferometer where nearly 100% of the original beam in incident on the detector is advantageous to the use of a non-polarizing Sagnac interferometer where only 50% of the original beam is incident on the detector. Thus in the Examiner's opinion, it would have be obvious to one of ordinary skill in the art to use a polarizing beam splitter (divider) to analyze the input light in order to obtain a better quality signal where most of the input light is incident on the detector rather than losing nearly half of the input light in a non-polarizing Sagnac interferometer.

As for the use of the term "substantially" or "preferentially," the use of a polarizing beam divider inherently divides the beam into a beam that is substantially polarized in one direction and a beam that is substantially polarized in another direction. If the polarizing beam divider did not perform such polarizing beam splitting, then it would be an ordinary beam splitter of the non-polarizing variety. Furthermore, Hock teaches the use of "circularly polarized" or "linearly polarized at 45 degrees" for the input light suggesting that the skilled artisan choose a preferred polarization orientation and not to use an unknown or random polarization orientation.

In addition, the Appellant's Specification does not clearly define a "preferred" polarization since only examples of different polarization orientation to choose from.

Appellants argue on page 4, that McNamara specifically refers to Cabib in their specification and yet does not incorporate a Sagnac interferometer. The Examiner respectfully disagrees. In the specification, McNamara describes the measurement apparatus to be use in Example 1 (column 42) and Figures 1 and 2, and specifically suggests using the Sagnac interferometer of Cabib in order to take the measurements. Furthermore, it appears that the Appellants agree that McNamara uses Cabib's Sagnac interferometer where the Appellants state, "Hock was issued in 1974, and thus, was available to McNamara, especially given McNarama's use of Cabib."

As for Appellants argument on page 4, that "Hock was issued in 1974, and thus, was available to McNamara, especially given McNarama's use of Cabib," both McNamara and Cabib disclose subject matter related to the objectives of the invention itself and are not to disclose every embodiment possible.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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December 10, 2003

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